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Part X

Department of Agriculture

Science and Education Administration

Plant Biology and Human Nutrition; Competitive Research Grants Program for Basic Research for Fiscal Year 1981; Solicitation of Applications

DEPARTMENT OF AGRICULTURE

Science and Education Administration

Plant Biology and Human Nutrition; Competitive Research Grants Program for Basic Research for Fiscal Year 1981; Solicitation of Applications

Notice is hereby given that under the authority contained in section 2(b) of the Act of August 4, 1965, Pub. L. 89–106, as amended by section 1414 of Pub. L. 95–113 (7 U.S.C. 450i(b)), the Science and Education Administration (SEA) through its Competitive Research Grants Office (CRGO) will award competitive grants for mission-oriented basic research in four areas of plant sciences (biological nitrogen fixation, biological stress on plants, photosynthesis, and genetic mechanisms for crop improvement) and human nutrition (nutrient requirements). Proposals may be submitted through their parent organizations by scientists associated with State agricultural experiment stations, all colleges and universities, other research institutions and organizations, Federal agencies, private organizations or corporations, and individuals.

The total amounts available for such grants during Fiscal Year 1981 are $12,610,000 for plant sciences research and $2,910,000 for human nutrition research.

The Guide to Proposal Preparation for these competitive grants consists of three parts:

I. Types of Research to be Supported in FY 1981;
II. Proposal Submission;
III. Proposal Review and Evaluation.

A Grant Application Kit has been developed which provides the forms, instructions, and other relevant information needed to apply for research grants under the programs described herein. To obtain a copy(ies) of the Grant Application Kit, write or call the Grants Administrative Management Office (Address and telephone number below):

Grants Administrative Management Office, Attention: Proposal Services Unit, Science and Education Administration, USDA, Suite 103, Rosslyn Commonwealth Building, 1300 Wilson Boulevard, Arlington, Virginia 22209, Telephone: (703) 235–2638.

Additional instructions relating to proposal preparation are included in Part II of the Guide to Proposal Preparation.

Proposals will be selected for funding after review of all proposals by a scientist serving as a CRGO Program Manager, by *ad hoc* reviewers, and by an assembled panel of scientists who constitute a spectrum of expertise for the program to which each proposal is assigned (See Part III of the Proposal Preparation Guide).

This Notice incorporates suggestions from various agencies of the U.S. Department of Agriculture (USDA), from liason representatives of other Federal agencies and prospective performing organizations, and from *ad hoc* groups on plant sciences and on human nutrition.

According to the requirements for Federal assistance program announcements under Pub. L. 95–220, The Federal Program Information Act, the following information is provided with respect to the areas of research described in this announcement for which project grants will be awarded:

(1) As outlined by OMB Circular No. A–89, the official program number and title for these grants are: 10.884, Grants for Agricultural Research, Competitive Research Grants.

(2) OMB Circular No. A–95, regarding State and local clearinghouse review of Federal and Federally assisted programs, does not apply.

The grants awarded under this Program will be administered in accordance with applicable OMB Circulars and Form SEA–638, General Provisions for Grants and Cooperative Agreements. A copy of Form SEA–638 is included in the Grant Application Kit.

The determination of allowable costs shall be made in accordance with the following applicable Federal Cost Principles in effect on the effective date of the Agreement:

Educational Institutions and Hospitals—OMB Circular A–21;

Nonprofit Organizations—OMB Circular A–122;

Commercial Firms—FPR 1–15.2;

State and Local Governments—FMC 74–4 (Formerly OMB Circular A–87).

Most of the grants awarded in Fiscal Year 1981 will be for a duration of one to three years. The total amount awarded for each of these grants will be from Fiscal Year 1981 funds. A number of continuation grants will be made for three to five years where longer term studies are required. The continuation grants will be funded in increments covering a one-year period. The initial increment will be funded from Fiscal Year 1981 appropriations.

When an original grant award includes a provision for more than one budget period within the project period, SEA presumes that continuation grants for the subsequent budget periods will be awarded subject to availability of funds, if the grantee:

(1) Has demonstrated satisfactory performance during all previous budget periods; and

(2) Submits no later than 90 days prior to the end of the budget period a continuation application which includes a detailed progress report; a financial statement for the current budget period, including an estimate of the amount of unspent, uncommitted funds which will be carried over beyond the term of the prior grant; a budget for the new budget period; an updated work plan revised to account for actual progress accomplished during the current budget period; and any other reports as may be required by the grant agreement.

Review of continuation applications will be conducted expeditiously. Generally, no extramural review will be required.

Neither the approval of a project nor the award of any grant shall commit or obligate the United States to award any continuation grant or enter into any grant amendment, including grant increases to cover cost overruns, with respect to any approved project or portion thereof.

Section 2(b) of Pub. L. 89–106, as amended by Section 1414 of Pub. L. 95–113, states that these competitive grants shall be awarded without regard to matching funds by the recipient(s) of such grants.

It has been determined that, because of the need to implement this program so that research relating to plant production can be initiated in the Spring of 1981, compliance with the Notice and public procedure provisions of 5 U.S.C. 553 is impracticable and contrary to the public interest and, in accordance wth E.O. 12044, that it is not possible to publish this Notice in proposed form and allow 60 day for public comment.

Done at Washington, D.C., this 30th day, of December, 1980.

Anson R. Bertrand,

Director, Science and Education.

Guide to Proposal Preparation

I. Types of Research to be Supported in Fiscal Year 1981

The Science and Education Administration will award both standard research grants and a small number of continuation grants for periods not to exceed five years, on a competitive basis, to support basic research underlying the mission of the USDA. Basic research grants will be considered in selected areas of plant science and human nutrition, which have been considered by a number of scientific groups to possess exceptional opportunity for fundamental scientific discovery and for contributing, in the

long run, to applied research and development vitally needed on important food and nutrition problems. This grants program results from the recognition that new, innovative approaches and enhanced levels of funding are needed as we seek ways to increase food production and improve human nutrition.

Consideration will be given to research proposals which address fundamental questions in the areas noted below and which are consistent with the long-range missions of USDA. While a basic guideline is provided to assist members of the scientific community in assessing their interest in the program areas and to delineate certain important areas where new information is vitally needed, the guidelines are not meant to provide boundaries or to detract from the creativity of potential investigators. Accordingly, it is hoped that innovative projects in the so-called "high-risk" category as well as those which may have a higher payoff potential will be submitted.

The following guidelines are thus provided as a base from which proposals may be developed:

A. Plant Science. 1. Biological Stress on Plants. Plants are exposed to many stresses that may adversely affect their productivity and usefulness to man. This grants program will support research on stresses on plants arising from their interactions with other plants or with other biological agents such as weeds, insects, nematodes, fungi, bacteria, viruses, and mycoplasma-like organisms. The ultimate goal of the research supported in this area is to reduce losses in plant productivity from damage caused by biologically generated stresses. The program area will emphasize studies that enhance our understanding of (a) how stressful interactions are established between plants and other biological agents, (b) how such interactions are influenced by environmental and other factors inherent to the interacting organisms, (c) how the interactions reduce plant productivity and usefulness to man, (d) how plants react to stresses generated by such interactions, and (e) how damage from such interactions may be reduced or eliminated. The interactions may be studied at any number of levels; i.e., population, organismal, cellular and molecular; and by various approaches including genetics, molecular biology, and biochemistry. These may include studies on plants separated from stress-causing organisms or on stress-causing organisms separated from their target plants. However, such studies should provide information that will be relevant to the understanding of the causes, consequences, and avoidance of biologically generated stresses on plants. The research supported in this program area will focus on the identification of new approaches to reduction of plant stress caused by biological agents, approaches that will be both effective and compatible with social and environmental concerns.

2. Genetic Mechanisms for Crop Improvement. The major aim of this program area is to encourage innovative or unique genetic approaches directed to the development of genetically superior varieties of agricultural crops. The approaches should be aimed at obtaining novel genetic combinations or gene modifications difficult or impossible to achieve using conventional plant breeding techniques. This research area thus will emphasize the following: (a) Cell culture studies including the regeneration of plants from single cells, cell/protoplast fusion, mutagenesis, and incorporation of foreign DNA, chromosome, or organelle; (b) development of effective celular and molecular methods for identification of plant characteristics or genes which are significant targets for genetic manipulation; (c) development of methods for producing, selecting, and transferring desired genetic traits including both qualitative and quantitative traits; (d) acquisition of basic information on nuclear and organelle plant gene expression and diversity at the molecular, cellular, or developmental level to facilitate application to plant improvement; and (e) basic genetic studies on maintenance, alteration, and utilization of unadapted and wild germplasm. Proposals to conduct well-defined basic plant genetic studies in support of plant breeding programs and designed to improve understanding of basic genetic mechanisms of the crop are encouraged. These guidelines are not meant to exclude other new or unusual approaches to crop improvement.

3. Biological Nitrogen Fixation. The most common limiting nutrient for plant growth is nitrogen. The presence of soil nitrogen is due to past accretions in nature, biological nitrogen fixation or the application of nitrogenous fertilizer. The latter represents a significant energy input in cropping and ultimately increases food costs. Thus, the enhancement of biological nitrogen fixation capacity in plant-soil microbial associations is of major importance. Research aimed at understanding nitrogen fixing mechanisms and related nitrogen metabolsim in both symbiotic and free living organisms as well as the fate of fixed nitrogen is of high priority.

In general, the objectives in this program area include building a foundation of basic information concerning nitrogen fixation as it relates to enhancing the process in currently known systems and in providing a base for developing new nitrogen fixing association, by genetic transfer or other means, for crop species not now possessing such capability. Moreover, the process of nitrification (the oxidation of ammonia to nitrate), the assimulation and utilization of ammonia and nitrate, and denitrification (the reduction of nitrate to volatile forms of nitrogen which are lost from the soil) all play important roles in plant growth. Soil nitrogen, whether supplied by biological nitrogen fixation or as chemical fertilizer serves to increase food production only when it is present in an available form which is not lost from the plant-soil ecosystem.

Examples of research encompassed in this program area include: (a) Structure and mechanism of action of nitrogenase; the regulation of nitrogenase activity and synthesis; the relationship between nitrogenase and hydrogenase activities in nitrogen fixing organisms; (b) energetics of the nitrogen fixation process including competitive processes within the plant; (c) infection by *Rhizobium* and conditions for effective nodulation; basis of the recognition process between symbiotic organisms; factors controlling symbiont specificity; competition in the soil; (d) identification of additional organisms capable of nitrogen fixation and quantitation of their contribution; (e) relation between the fixation process and the processes of assimilation, nitrification and denitrification; (f) the development of methods for the *in situ* measurement of nitrification and denitrification, and determination of the actual extent of these processes in nature; (g) an analysis of the distribution of denitrifying bacteria and elucidation of control mechanisms operative on nitrogen transformations in the major species; (h) studies of the transfer and utilization of fixed nitrogen including the enzymes involved in the assimilation and dissimilation of fixed nitrogen in bacteria and crop plants; and (i) the efficiency of nitrogen utilization by crop plants in the production of food proteins.

Emphasis in program priorities will be on innovative approaches which may contribute to a thorough understanding of nitrogen cycling encompassing biochemistry, cellular and developmental biology, genetics and genetic manipulation, and other relevant

life science disciplines. An understanding of these processes is essential to the development of strategies which maximize nitrogen fixation, minimize inputs of nitrogenous fertilizers and optimize their utilization in agriculture.

4. Photosynthesis. There are many indications that productivity of crop plants may be increased by increasing their photosynthetic efficiency. Basic research aimed toward providing an increased understanding of photosynthesis and associated carbon metabolism is an essential part in achieving that objective. Expansion of research is needed, but not exclusively, in three major sub-areas: (a) The identification of aspects of photosynthesis which limit the conversion of solar energy into stable chemical products which include such areas as the mechanisms of energy capture and conversion, structure, synthesis, and turnover of the photosynthetic apparatus, CO_2 fixation, photo-respiration and dark respiration; (b) the relation of plant development to photosynthesis including the development of photosynthetic competence, translocation and partition of photosynthetic productivity; and (c) the design of new methods of genetic and cellular manipulation to improve photosynthetic efficiency in plants to include studies of the chloroplast genome, of nuclear genes regulating photosynthesis, and analysis of regulatory steps controlling both nuclear and cytoplasmic genome expression and their interactions. Other research designed to generate new information in areas that relate to photosynthesis and its accompanying processes in the context of the objectives of the program area may also be considered a part of this area.

B. Human Nutrition. Proposals are invited in the following program area. Support will not be provided for clinical research nor for demonstration and action projects.

Human Requirements for Nutrients.—Research in this program area is intended to contribute to the improvement of human nutritional status by increasing our understanding of requirements for nutrients. The objective is to support basic, creative research that will help to fill gaps in the knowledge about nutrient requirements, bioavailability, the interrelationships of nutrients, and the nutritional value of foods that are consumed in the U.S. as these relate to requirements. Special attention will be given to requirements for trace constituents. Innovative approaches designed to improve methods of research and investigation that will increase the reliability and validity of research results will be given special consideration.

Proposals dealing with processing techniques should be clearly oriented towards determination of human nutrient requirements. Proposals which concern utilization or production of a food commodity should emphasize the relationship to specific human nutrient requirements. It is especially important that proposals emphasize innovative (creative) fundamental (basic) research.

II. Proposal Submission

A. Proposal Purpose. The purpose of a proposal is to persuade the reviewing peer scientists and the CRGO staff that the proposed project is feasible and sufficiently meritorious to warrant support under the criteria enumerated in Part III B. It should be clear, concise, technically correct, and relevant to the competitive grants program. The qualifications for the investigator, the institution facilities, and the level of funding to be devoted to the proposed project should be clearly delineated.

B. Who May Submit Proposals. Proposals for support under the competitive research grants program may be submitted by qualified scientists associated with the State agricultural experiment stations, all colleges and universities, other research institutions and organizations, Federal agencies, private organizations or corporations, and individuals. Proposals from scientists at non-United States organizations will not be considered for support. Only in special situations, where it can be demonstrated that a proposed project will contribute directly to breakthroughs in the food and agricultural sciences, will proposals from unaffiliated scientists be given favorable consideration.

C. Where and When to Submit Research Proposals. Twenty copies of each research proposal must be submitted by the time limits set below to: Grants Administrative Management Office (GAMO), Attention: Competitive Research Grants Program, Science and Education Administration, USDA, Suite 103, Rosslyn Commonwealth Building, 1300 Wilson Boulevard, Arlington, Virginia 22209.

Proposals will be reviewed by peer panels (as described in Part III) which will assemble on specific dates. In order to be considered for funding during Fiscal Year 1981, the proposals must be postmarked by the following dates:

February 13, 1981 for Biological Nitrogen Fixation;
February 20, 1981 for Genetic Mechanisms for Crop Improvement;
February 20, 1981 for Photosynthesis;
February 27, 1981 for Biological Stress on Plants;
February 27, 1981 for Human Nutrient Requirements.

D. What to Submit. Your submission should include an original and 19 copies of the proposal and Form SEA–661, Grant Application, which is included in the Grant Application Kit. The Form SEA–661 submitted with the original proposal should have original signatures of the Principal Investigator(s) and the Authorized Organizational Representative. SEA must have original signatures on file for each application.

The applicable specific area of inquiry (program area) should be indicated in Block 8 of Form SEA–661 provided in the Grant Application Kit. *Select one program area only.* Indicating more than one program area does not mean the proposal will be considered under more than one. It only delays processing of the proposal in GAMO. The final determination of the area and change (if any) will be made by the program staff and/or the appropriate panel. The number assigned to the program area (see below) must also be cited in Block 8 of Form SEA–661.

Number and Program Area

1—Biological Stress on Plants
2—Genetic Mechanisms for Crop Improvement
3—Biological Nitrogen Fixation
4 Photosynthesis
5—Human Requirements for Nutrients

All copies of the proposal should be mailed in one package, if at all possible. Due to the volume of proposals received, proposals submitted in several packages are very difficult to identify. If copies of the proposal *are* mailed in more than one package, the number of packages should be marked on the outside of each. It is important that *all packages be mailed at the same time.* The acknoledgement of receipt of the proposal will contain a proposal number, title, program, and program area. Later inquiries, addenda, etc., should include this information. However, every effort should be made to *assure* that the *proposal contains* all *pertinent information when initially submitted.* Prior to mailing, compare your proposal with the Application Requirements checklist contained in the Grant Application Kit and instructions in Part II E, Format for Research Proposal, which follow.

E. Format for Research Proposal. The Grant Application Kit (available from GAMO) includes forms, instructions, and other information to be used in applying for research grants which will be awarded in the areas described in

Part I, Types of Research to be Supported in FY 1981.

Additional information and/or instructions relating to the format and content of the research proposal follow:

1. Title of Proposal.—The title (80 characters maximum) will be used for the USDA Current Research Information System (CRIS), for information to Congress and for press releases. Therefore, it should not contain highly technical words. Phrases such as "Investigation of" or "Research on" should not be used.

2. Approval Signatures of Appropriate Officials.—All proposals from a university, college, or institution must be signed by an authorized official.

3. Research Involving Special Considerations.—A number of situations frequently encountered in the conduct of research require special information and supporting documentation before funding can be approved for the project. If special information or supporting documentation is involved, the proposal should so indicate. Since some types of research targeted for SEA support have a high probability of involving either recombinant DNA or human subjects, special instructions follow:

Recombinant DNA.—Principal investigators and endorsing performing organization officials must comply with the guidelines of the National Institutes of Health (See NIH "Guidelines for Research Involving Recombinant DNA Molecules" (43 FR 50108–60131) and subsequent revisions). A Memorandum of Understanding and Agreement and approval by the local Biohazards Safety Committee, must be provided before a grant can be awarded.

Human Subjects.—Safeguarding the rights and welfare of human subjects used in research supported by SEA grants is the responsibility of the performing organization. The informed consent of the human subject is a vital element in this process. Guidance is contained in Pub. L. 93–348, as implemented by Part 46, Subtitle A of Title 45 of the Code of Federal Regulations, as amended (45 CFR Part 46).

If the project involves human subjects at risk, the grantee must furnish SEA with a statement that the research plan has been reviewed and approved by the appropriate Institutional Review Board at the grantee organization, and that the grantee is in compliance with Department of Health and Human Services (DHHS)—formerly Department of Health, Education and Welfare (DHEW)—policies, as amended, regarding the use of human subjects. Form SEA–84, Protection of Human Subjects, may be used for this purpose.

4. Project Summary. The Research Proposal should include a one-page Project Summary to focus on: overall objectives and project goals; relevance and significance of the project; and experimental methods and approaches.

The Project Summary is not intended for the general reader so should be couched in language which will be meaningful to others in the field of science.

5. Project Description (15-page maximum). a. Introduction—State overall objective(s) and long-term goal(s) of the proposed research. Review the most significant previous work, including your own, and describe the current status of research in this field. Document with references.

b. Rationale and Significance—Present concisely the rationale behind the proposed research and list specific objectives for the total period of requested support. Show how these objectives relate to potential long-range improvements in food production or human nutrition. What is the potential importance of the proposed research? Discuss any novel ideas or contributions which the project offers.

c. Experimental Plan—State clearly your hypotheses or the questions you will ask and give details of the research plan. Include a description of the experiments or other work proposed; the methods and techniques to be employed and their feasibility; the kinds of results expected; and the means by which the data will be analyzed or interpreted. Include, if appropriate, a discussion of pitfalls that might be encountered, and limitations of the procedures proposed. Insofar as possible, describe the principal experiments or observations in the sequence in which it is planned to carry them out, and indicate, if possible, a tentative schedule of the main steps of the investigations within the project period requested.

d. Facilities and Equipment—Describe the facilities available for this project, including laboratories. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. List major items of instrumentation and those major items of nonexpendable equipment needed to complete the work.

e. Collaborative Arrangements—If the proposed project requires collaboration with other research organizations, describe the collaboration and provide evidence to assure the reviewers that the organizations involved agree. If separate written assurances are to be included, they should be placed after the References to the Project Description. Indicate specifically whether or not such collaborative arrangements might have the potential for any conflict of interest. Projects involving collaboration should indicate which organization is to receive the grant since only one submitting organization can be the recipient of a grant for each proposal. Subcontract arrangements of research work should be indicated under Item I of the Proposal Budget, Form SEA–55.

6. References to Project Description. These references should follow an accepted journal format.

7. Vitae and Publications List(s) of Principal Investigator(s). Vitae of the principal investigator, senior associates, and other professional personnel should be provided to assist reviewers in evaluating the competence and experience of the project staff. This section should include curricula vitae of all key persons who will work on the project, whether or not Federal funds are sought for their support. Provide for each person a chronological list of the most representative publications during the preceding 5 years including those in press. List the authors in the same order as they appear on the paper, the full title, and the complete reference as these usually appear in journals.

8. Additions to Project Description. Each project description is expected by the members of review committees and the staff to be complete in itself. Distribution of additional material, other than for the records, is limited to the principal reviewers. In those instances where additional material is necessary (as for example: photographs which do not reproduce well, and reprints or other especially pertinent material which are not suitable for inclusion in the proposal), 6 copies or sets, identified by title of the research project and name of the Principal Investigator, should accompany the proposal.

III. Proposal Review and Evaluation

A. Proposal Review.—Research proposals received by CRGO will be acknowledged and assigned to the appropriate program for scientific evaluation.

All proposals will be carefully reviewed by a scientist serving as a CRGO Program Manager and by additional scientists who are experts in the particular field represented by the proposal. Program Managers will also conduct discussions and obtain comments from assembled peer panels of scientists before recommending proposals for funding.

B. Criteria for Selection of Projects.—The following criteria or factors are considered in the evaluation of research proposals:

1. The scientific merit of the proposal, including the suitability and feasibility of the approaches and methodology.

2. The probability that the research will contribute to important discoveries or significant breakthroughs in food production or human nutrition in relation to the mission of this program.

3. The qualifications of the Principal Investigator and other senior personnel, such as training, demonstrated awareness of previous and alternative approaches to the problem, and performance record and/or potential for future accomplishment.

4. The probable adequacy of available or obtainable facilities, equipment, instrumentation, and technical support.

C. Revisions to Proposals During Review Process.—Prior to recommending whether or not SEA should support a particular project, the Program Manager may engage in discussions with the proposing Principal Investigator. Should such discussions result in proposed changes which exceed 10 percent of the proposed grant amount or $10,000, whichever is less, a revised proposal budget, signed by both the proposing Principal Investigator and by the Authorized Organizational Representative, must be submitted on Form SEA–55 in an original and two copies to the cognizant CRGO Program Manager for incorporation into the proposal file.

Should such discussions result in changes in the basic objectives or scope of the project as originally proposed, an appropriate proposal modification, signed and endorsed as above, must be submitted to the CRGO Program Manager.

D. Grant Awards.—The applicants submitting proposals judged most meritorious under the criteria in III B above will be awarded grants for periods not to exceed five years, within the limitations of available funds.

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